(12) UK Patent Application (19) GB (11) 2 270 552 (13) A

(43) Date of A Publication 16.03.1994

(21) Application No 9318132.9

(22) Date of Filing 01.09.1993

(30) Priority Data
(31) 9212203 (32) 10.09.1992 (33) DE

(51) INT CL[5]
F16D 3/12

(52) UK CL (Edition M)
F2U U224 U286 U314 U340 U396
U1S S2014

(56) Documents Cited
GB 2261718 A

(58) Field of Search
UK CL (Edition L) F2U
INT CL[5] F16D

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(54) **Clutch plate with radially resilient plastics ring**

(57) A clutch plate with a torsional vibration damper in particular for friction clutches of motor vehicles, comprises a hub (1), Fig. 1 with a disc (2), cover plates (3, 4) arranged on both sides of the disc and securely connected together, and rotatable through a predetermined amount in relation to the disc against the force of springs, the radial guiding of the relatively rotatable components taking place through the one cover plates (3) and a plastics ring (8) inserted in a central opening of the cover plate (3), made of limited radial elasticity, and being seated on a cylindrical portion of the hub. The ring (8) has a circumferentially continuous inner portion (9), Fig. 2 having a diameter D_4 by which it is seated on the cylindrical region (6) of the hub (1) with some clearance and with a number of circumferentially distributed arcuately curved and circumferentially extending radially resilient tongues (10) lying radially outside the inner portion (9) and by which it is inserted in the central opening of the cover plate (3) of diameter D_2 under radial pre-loading.

Fig. 1

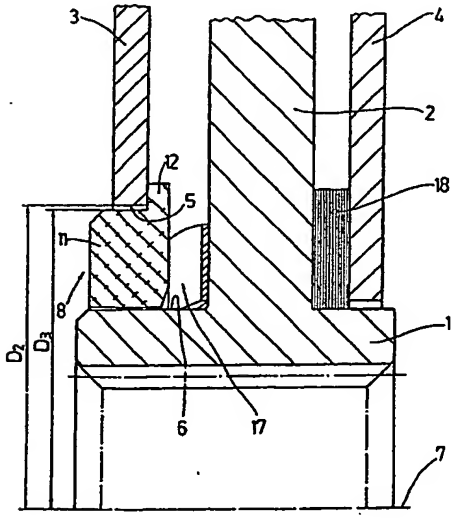

Fig. 2

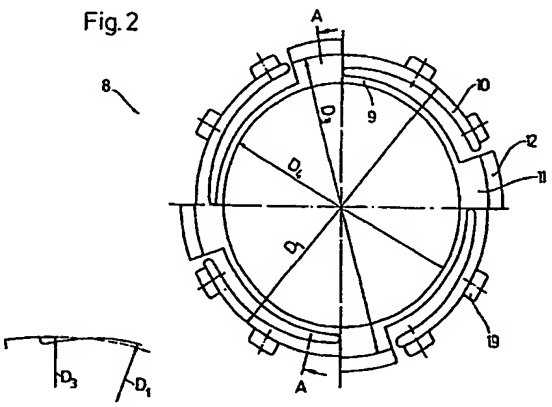

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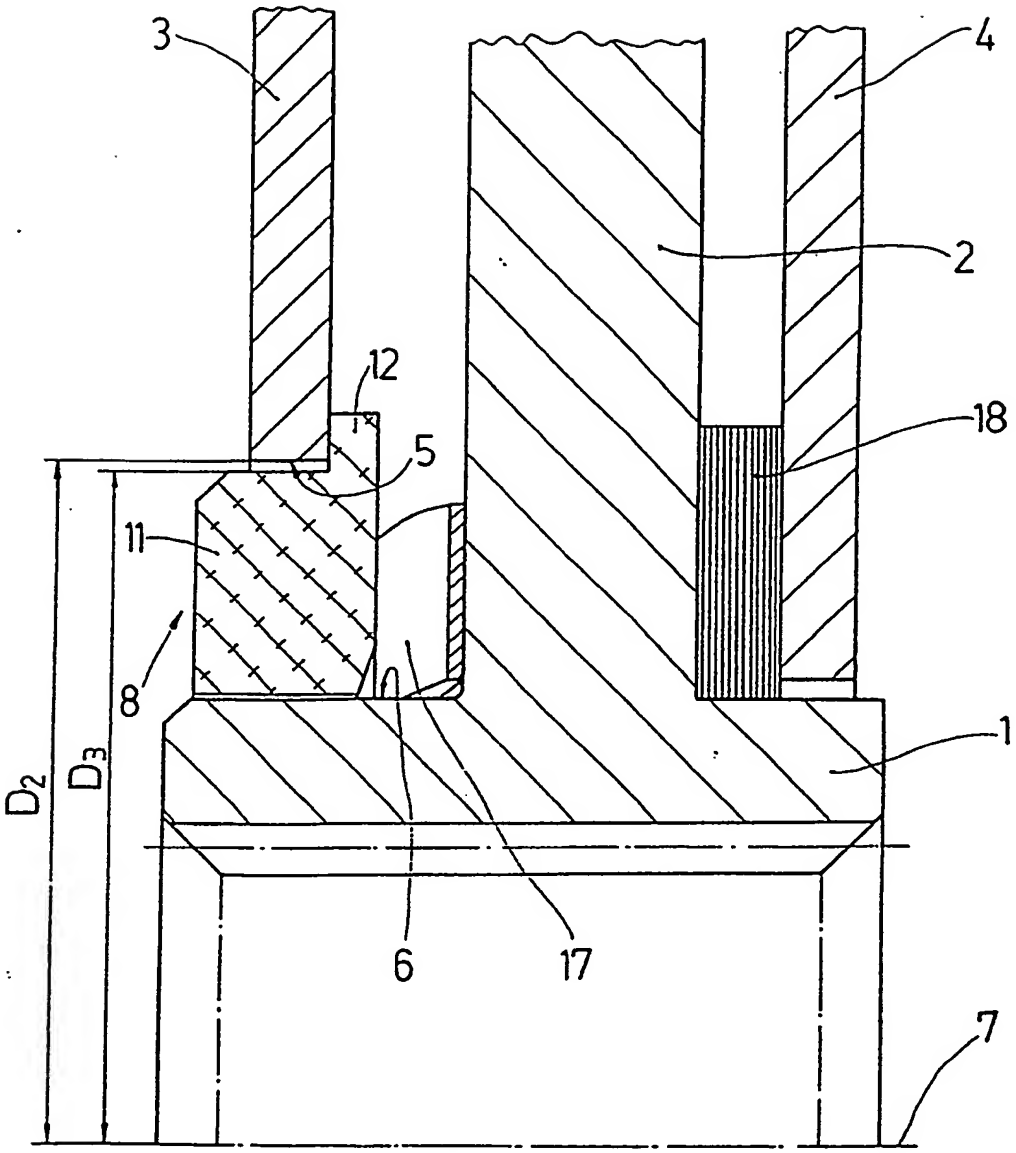
Fig. 1



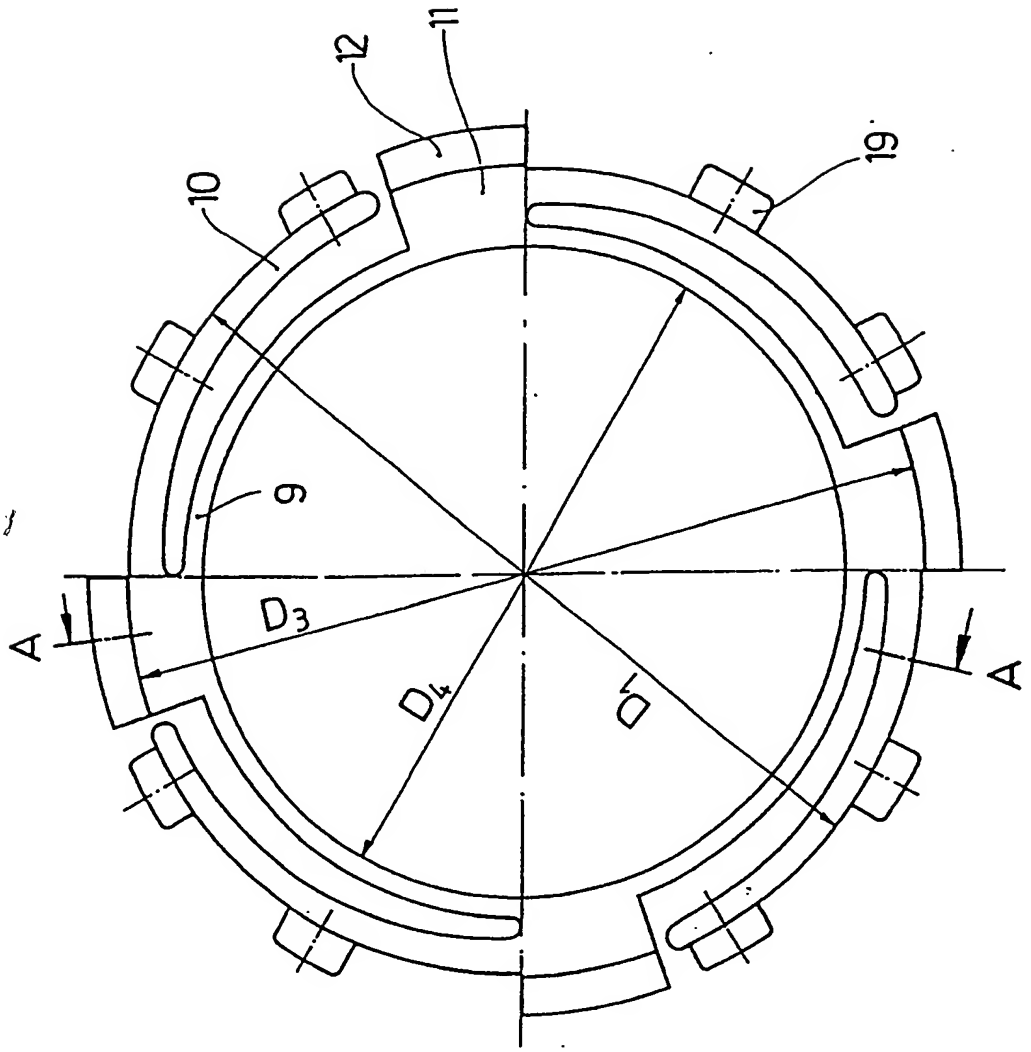


Fig. 2

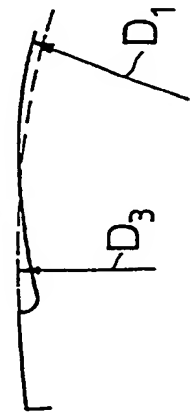


Fig. 3
A - A

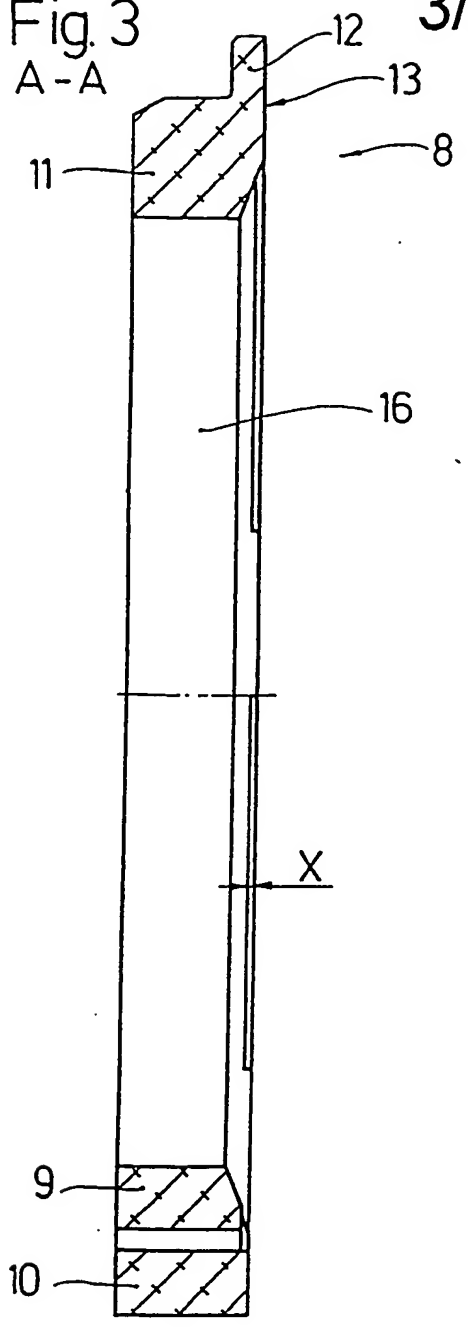
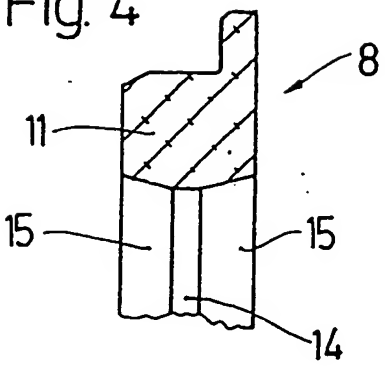


Fig. 4



CLUTCH PLATE WITH RADIALLY RESILIENT PLASTICS RING

The invention relates to a clutch plate with a torsional vibration damper, in particular for friction clutches of motor vehicles comprising a hub with a hub disc, covering plates arranged on both sides of the hub disc and securely connected together and rotatable through a predetermined amount in relation to the hub disc against the force of springs, the radial guiding of the relatively rotatable components taking place through the one cover plate and a plastics ring inserted in a central opening in the cover plate, which ring is made radially elastic within limits and being seated on a cylindrical portion of the hub.

Such a plastics ring is known from German OLS 39 21 283. For radial springing this plastics ring is made somewhat S-shaped in cross-section and is divided peripherally into a number of blocks, separated from one another by radially extending slots.

In one embodiment in accordance with the state of the art the radial spring movements are relatively small and the peripherally interrupted engagement in relation to the hub is not without its problems, in particular with regard to the uniformly low generation of friction.

It is accordingly an aim of the present invention to improve a clutch plate of the above-mentioned construction in such a way that on the one hand relatively large radial spring movements are possible and on the other hand the basic friction that can be achieved by the arrangement can be held as constant as possible.

According to the invention this problem is solved in that the plastics ring has a circumferentially continuous inner portion having a first diameter by which it is seated on the cylindrical region of the hub with some clearance and with a number of circumferentially distributed arcuately curved and circumferentially extending radially resilient tongues lying radially outside the inner portion and by which it is inserted in the central opening of the cover plate of second diameter under radial pre-loading.

The circumferentially continuous inner region of the plastics ring ensures uniform generation of friction forces under all conditions of load as well as a long working life in this region. The arcuate curved and circumferentially extending radially resilient tongues arranged radially outside the closed region provide the radial elasticity of the plastics angle over the cover plate. In this arrangement these tongues are preferably arranged so that approximately the same stress arises in the material at all points on maximum spring movement. In this way a uniform elasticity is achieved and the generation of friction forces for the basic friction is thereby kept substantially constant, independent of the the loading.

According to a further feature of the invention it is proposed that each tongue is connected to the inner portion through a block at its one circumferential end region and each block is made to extend from the diameter D_4 of the inner portion to the diameter D_3, and the diameter D_3 is made smaller, by the amount of the maximum spring movement, than the central opening in the cover plate of diameter D_2. In this way the spring movement is accurately restricted and the tongues are protected against overloading.

Furthermore, the plastics ring is provided at least in the region of the blocks with radially projecting noses for guiding it axially in relation to the inside wall of the cover plate, these noses forming an axial location in relation to the cover plate. In such an arrangement it is also possible without difficulty to provide the individual tongues likewise with one or more radially projecting noses for axial location.

It is furthermore proposed to set back the inner part of the plastics ring in relation to the surfaces which face the hub disc of the hub. In this way we ensure that on axial loading of the plastics ring by the spring or wavy spring generating the basic friction the circumferentially continuous inner portion is not affected.

A further advantageous embodiment of the invention is to be seen in the feature that the inner portion of the plastics ring is provided with an axially narrow engaging surface in relation to the cylindrical part of the hub, by arranging chamfers on both axial faces. This embodiment of the plastics ring may be advantageous in those fields of use in which an angular misalignment can arise between the gearbox shaft of the vehicle and the crankshaft. In this way it is possible to deal with these possible inclined positions without the plastics ring suffering damage on the one hand and on the other hand without the generation of friction forces at this point being influenced.

For the use envisaged the plastics ring is preferably made of reinforced plastics. This signifies that additives or fillers, e.g. in the form of reinforcing fibres, are provided, such as for example

glass fibres. These can for example amount to up to about 30% by weight. The stability of shape of the plastics ring and its elasticity are improved by these additions.

The invention is further explained in the following in conjunction with an embodiment by way of example only. In the drawings:

Fig. 1 is a partial longitudinal section through a clutch plate in the region of the hub;

Fig. 2 is a front view of the plastics ring;

Fig. 3 is a section of the line A-A in Figure 2; and

Fig. 4 shows a variant of the plastics ring of Fig. 3 in partial section.

Fig. 1 illustrates the overall situation in the form of a partial longitudinal section of a clutch plate. A hub 1 with a radially projecting disc 2 is arranged concentrically on a axis of rotation 7. The hub 1 has splines on its internal surface, by which it can engage for rotation on splines (not shown) on a gearbox spindle. On both sides of the disc 2 can be seen the radially innermost portions of cover plates 3, 4 which are connected securely together at their radially outer portions and held spaced apart. The friction linings of the clutch disc are arranged from one of the cover plates 3, 4. Arranged between the disc 2 and the cover plates 3, 4 there are springs (likewise not shown) which on the application of torque allow relative rotation between the disc 2 and the two cover plates 3, 4. To guide the two cover

plates 3, 4 in relation to the hub 1 the latter has a cylindrical region 6 on one side of the disc 2. The two cover plates 3, 4 are supported on this cylindrical region 6 by means of a plastics ring 8 which is inserted in a central opening 5 in the cover plate 3. In this arrangement the plastics ring 8 is acted on axially in the usual way by a wavy spring 17 which abuts against the disc 2. On the opposite side there is arranged between the cover plate and the disc 2 a friction ring 18 which is loaded axially by the force of the wavy spring 17 and generates a basic friction. The plastics ring 8 contributes to this basic friction as well by its contact with the hub 1 in the cylindrical region 6.

Fig. 2 shows a front view of the plastics ring 8 and Fig. 3 a section through it on the line A-A. The plastics ring 8 has an inner portion 9 which is of a form which is continuous i.e. unbroken circumferentially. This inner region 9 has the diameter D_4 which provides clearance in relation to the cylindrical region 6 of the hub 1. Extending from the inner portion 9 there are a number of blocks 11 distributed circumferentially, and extending radially outwards. These radial blocks are given a diameter D_3 which is made smaller than the central opening 5 of diameter D_2 by the amount of the radial spring movement between the plastics ring 8 and the cover plate 3. Moreover each of the blocks 11 is provided with a radially projecting nose 12 which serves as an axial stop between the blocks 11 and the inner face of the cover plate 3. Extending circumferentially from each block 11 there is a radially resilient tongue, of which the end furthest from the block is free. Before the plastics ring 8 is mounted the radially outermost surface portions of the tongues 10 have a diameter D_1

which is greater than the diameter D_2 of the central opening 5 in the plate 3. When the plastics ring 8 is introduced into the central opening 5 the tongues 10, as a consequence of their own radial elasticity, lie within the central opening 5 under stress. Accordingly, the plastics ring 8 centres itself in relation to the opening 5 in the cover plate 3. The tongues 10 in this arrangement are with advantage made in such a way that the stresses in the material on maximum spring movement are substantially uniform over the entire circumferential extent. For axial location of the plastics ring 8 in relation to the cover plate 3 these tongues 10 can also be provided with radially projecting noses 19.

As shown in particular in Figure 3, the inner portion 9 of the plastics ring 8 is set back by the distance X in relation to the face 13 which is towards the disc 2. This spacing X ensures that the inner portion 9 is free of the wavy spring 27 and there can be no mutual influence between them.

Figure 4 shows an internal shape of the plastics ring 8 modified as compared with that of Fig. 3, in that in Fig. 3 the engaging surface 16 extends over the whole axial extent of the inner portion 9 whereas in Figure 4 the engaging surface 14 is reduced to a relatively narrow band by the provision of chamfers 15 extending from the respective faces of the ring 8. This reduction of the engaging surface 14 is provided to relieve or allow a tilting movement between the cover plates 3 and 4 and the hub 1 in the event that the installation which is provided makes this necessary.

CLAIMS

1. A clutch plate with a torsional vibration damper comprising a hub with a disc, cover plates arranged on both sides of the disc and securely connected together, and rotatable through a predetermined amount in relation to the disc against the force of springs, the radial guiding of the relatively rotatable components taking place through the one cover plate and a plastics ring inserted in a central opening of the cover plate and made of limited radial elasticity, and being seated on a cylindrical portion of the hub, in which the plastics ring has a circumferentially continuous inner portion having a first diameter by which it is seated on the cylindrical region of the hub with some clearance and with a number of circumferentially distributed arcuately curved and circumferentially extending radially resilient tongues lying radially outside the inner portion and by which it is inserted in the central opening of the cover plate of a second diameter under radial pre-loading.

2. A clutch plate according to claim 1, in which each tongue is connected to the inner portion at its one one circumferential end portion through a block and each block is made extending from the first diameter of the inner portion to a third diameter and the third diameter is made smaller than the central opening in the cover plate of said second diameter by the amount of the maximum spring movement.

3. A clutch plate according to claims 1 or 2, in which for guiding of the plastics ring in relation to the inner surface of the cover plate the ring has radially projecting noses at least in the region of the blocks.

4. A clutch plate according to claim 3, in which the inner portion of the plastics ring is set back in relation to the face which is towards the disc of the hub.

5. A clutch plate according to claim 3, in which the inner portion of the plastics ring is provided with an axially narrow surface of engagement with the cylindrical region of the hub, this being achieved by chamfers on both axial sides.

6. A clutch plate according to any of claims 1 to 5, characterised in that the plastics ring is preferably made of reinforced plastics.

7. A clutch plate substantially as described herein with reference to and as illustrated in Figs. 1 to 3 of the accompanying drawings.

8. A clutch plate substantially as described herein with reference to and as illustrated in Fig. 4 of the accompanying drawings.

Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report)	Application number GB 9318132.9
Relevant Technical Fields (i) UK Cl (Ed.L) F2U (ii) Int Cl (Ed.5) F16D	Search Examiner A BURROWS Date of completion of Search 13 OCTOBER 1993
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii)	Documents considered relevant following a search in respect of Claims :- 1-8

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P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages	Relevant to claim(s)
A	GB 2261718 A (FICHTEL & SACHS)	

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